

DRAFT FINAL (version 4, 12/19/18)

## APPENDIX B

LCA Results - Atmospheric Water Generation (AWG) Technologies and Alternative Potable Water Emergency Response

>>Select parameters of interest from drop down in green cells

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## Options

Parameter Description	Select Value	Instructions
Reusable Container Washing Method	Handwash	Select "Handwash" or "No Wash"
Jug Transport Distance	Average	Select "Average" if 75 miles, "Min"
Single-serve Bottle Weight	Minimum	Select Minimum (9.3 g) or Maximum
Single-serve Bottle Recycled Content	None	Select "0%" or "10%"
Recycling Allocation Method	Cutoff	Select "Cutoff" or "System Expansion"
Bottled Water Source	Spring Water	Select "Spring Water" or "Treated"
AWG Vendor	WaterGen	Select "WaterGen" or "Ecoloblu"
AWG Water Production	Average	Select "Minimum", "Average", or "Maximum"
AWG Electrical Grid	Average US	Select "Average US", "RFCW", or "Other"

### 1. Summary Comparative Results on an Equivalent Volume of Water Delivered Basis

Category	Unit	Total	
		Single-serve bottle	Reusable Jug
Acidification Potential	kg SO <sub>2</sub> eq	5.1E-04	2.3E-04
Cumulative Energy Demand	MJ	2.54	0.93
Eutrophication Potential	kg N eq	1.8E-05	1.2E-05
Fossil Depletion	kg oil eq	0.054	0.020
Global Warming Potential	kg CO <sub>2</sub> eq	0.12	0.061
Particulate Matter Formation Potential	kg PM <sub>2.5</sub> eq	3.0E-05	1.6E-05
Smog Formation Potential	kg O <sub>3</sub> eq	0.0079	0.0049
Solid Waste by Weight	kg SW eq	0.022	0.0016
Water Consumption	liter H <sub>2</sub> O	1.62	2.03

Category	Percent of Maximum		
	Single-serve bottle	Reusable Jug	AWG (Large Scale)
Acidification Potential	24%	11%	100%
Cumulative Energy Demand	45%	17%	100%
Eutrophication Potential	39%	26%	89%
Fossil Depletion	51%	19%	100%
Global Warming Potential	34%	17%	100%
Particulate Matter Formation Potential	25%	14%	100%
Smog Formation Potential	41%	25%	100%
Solid Waste by Weight	55%	4%	100%
Water Consumption	44%	55%	100%

## 2. Percent Contribution Results by Life Cycle Stage

Category	Small-Scale AWG Percent Contribution		
	Raw Material Production	Conversion	Water Treatment
Acidification Potential	39%	36%	0%
Cumulative Energy Demand	51%	16%	0%
Eutrophication Potential	49%	20%	3%
Fossil Depletion	53%	15%	0%
Global Warming Potential	43%	22%	0%
Particulate Matter Formation Potential	45%	31%	0%
Smog Formation Potential	40%	26%	0%
Solid Waste by Weight	12%	13%	0%
Water Consumption	11%	10%	72%

Category	Medium-Scale AWG Percent Contribution		
	Raw Material Production	Conversion	Water Treatment
Acidification Potential	11%	4%	0%
Cumulative Energy Demand	12%	3%	0%
Eutrophication Potential	12%	1%	5%
Fossil Depletion	12%	2%	0%
Global Warming Potential	14%	3%	0%
Particulate Matter Formation Potential	25%	3%	0%
Smog Formation Potential	7%	2%	0%
Solid Waste by Weight	0%	11%	1%
Water Consumption	1%	0%	58%

Category	Large-Scale AWG Percent Contribution		
	Capital Equipment	Transport to Point of Use	Operation
Acidification Potential	0%	0%	66%
Cumulative Energy Demand	0%	0%	66%
Eutrophication Potential	11%	0%	56%
Fossil Depletion	0%	0%	66%
Global Warming Potential	1%	0%	66%
Particulate Matter Formation Potential	2%	0%	64%
Smog Formation Potential	0%	0%	66%
Solid Waste by Weight	0%	0%	67%
Water Consumption	0%	0%	66%

### Medium-Scale AWG Percent Contribution

Category	Capital Equipment	Transport to Point of Use	Operation
Acidification Potential	1%	0%	66%
Cumulative Energy Demand	1%	0%	66%
Eutrophication Potential	20%	0%	47%
Fossil Depletion	1%	0%	66%
Global Warming Potential	1%	0%	65%
Particulate Matter Formation Potential	5%	0%	61%
Smog Formation Potential	1%	0%	66%
Solid Waste by Weight	0%	0%	67%
Water Consumption	0%	0%	66%

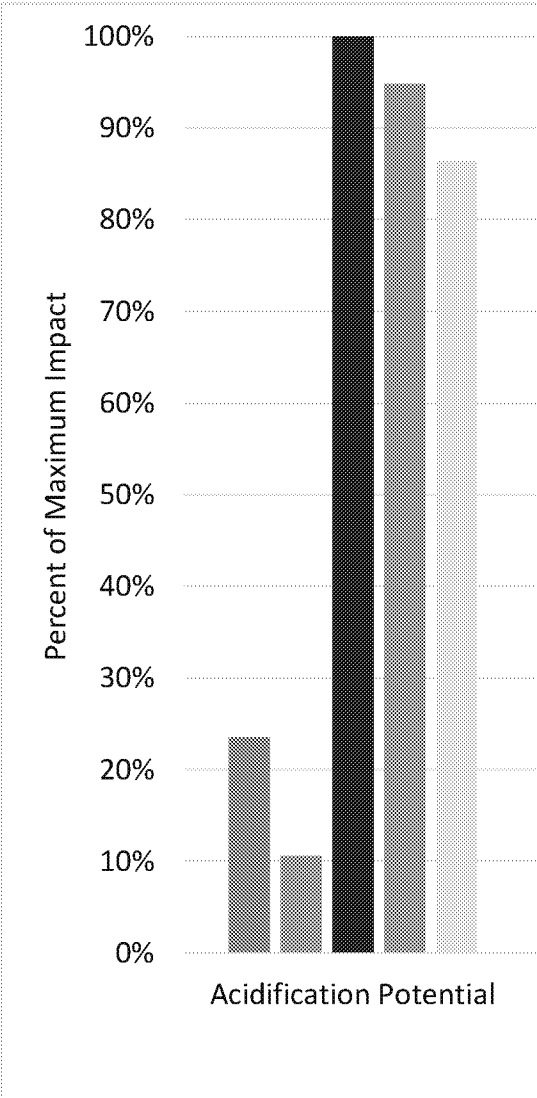
Home/Office-Scale AWG Percent			
Category	Capital Equipment	Transport to Point of Use	Operation
Acidification Potential	1%	0%	66%
Cumulative Energy Demand	1%	0%	66%
Eutrophication Potential	22%	0%	45%
Fossil Depletion	1%	0%	66%
Global Warming Potential	2%	0%	65%
Particulate Matter Formation Potential	6%	0%	61%
Smog Formation Potential	1%	0%	65%
Solid Waste by Weight	0%	0%	67%
Water Consumption	1%	0%	66%

	Default
Minimum" if 25 miles, "Maximum" if 125 miles	Handwash
um (10.9 g). Only lightweight options provided.	Average
	Minimum
sion"	None
d Municipal Water"	Cutoff
"	Spring Water
"Maximum"; Function of relative humidity and temperature (See Table 1)	WaterGen
"FRCC". RFCW and FRCC are eGRID subregions.	Average
	Average US

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Impacts Per Liter			
AWG (Large Scale)	AWG (Medium Scale)	AWG (Home/Office Scale)	Max
0.0022	0.0020	0.0019	0.0022
5.64	5.35	4.88	5.64
4.1E-05	4.6E-05	4.4E-05	4.6E-05
0.106	0.101	0.092	0.106
0.35	0.33	0.31	0.35
1.2E-04	1.2E-04	1.1E-04	1.2E-04
0.019	0.0185	0.017	0.019
0.040	0.038	0.034	0.040
3.66	3.55	3.38	3.66

AWG (Medium Scale)	AWG (Home/Office Scale)
95%	86%
95%	86%
100%	95%
95%	86%
95%	87%
99%	90%
95%	87%
94%	86%
97%	92%



### Single-Serve Bottle Percent Contribution

Filling	Transportation to Retail	Closure Life Cycle	Label Life Cycle	Secondary Packaging Life Cycle	Bottle End-of-Life	Total
1%	12%	6%	3%	4%	0%	100%
0%	8%	9%	4%	11%	0%	100%
0%	18%	4%	2%	3%	1%	100%
0%	9%	8%	4%	10%	0%	100%
0%	12%	7%	3%	9%	4%	100%
1%	9%	6%	3%	5%	1%	100%
0%	22%	5%	2%	4%	1%	100%
0%	1%	8%	6%	11%	49%	100%
0%	2%	2%	1%	2%	0%	100%

### Multi-Serve Reusable Jug Percent Contribution

Filling	Transportation to and from User	Closure Life Cycle	Reusable Container Washing	Jug Washing	Jug Recycling	Total
1%	38%	5%	33%	7%	0%	100%
1%	38%	9%	33%	5%	0%	100%
0%	38%	2%	33%	8%	0%	100%
1%	40%	8%	33%	4%	0%	100%
1%	40%	5%	33%	4%	0%	100%
1%	28%	4%	33%	5%	0%	100%
1%	52%	3%	33%	3%	0%	100%
3%	21%	11%	33%	18%	0%	100%
0%	2%	1%	33%	5%	0%	100%

### Reusable Container Washing Contribution

Reusable Container Washing	Disposal	Total
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%
33%	0%	100%

### Reusable Container Washing Contribution

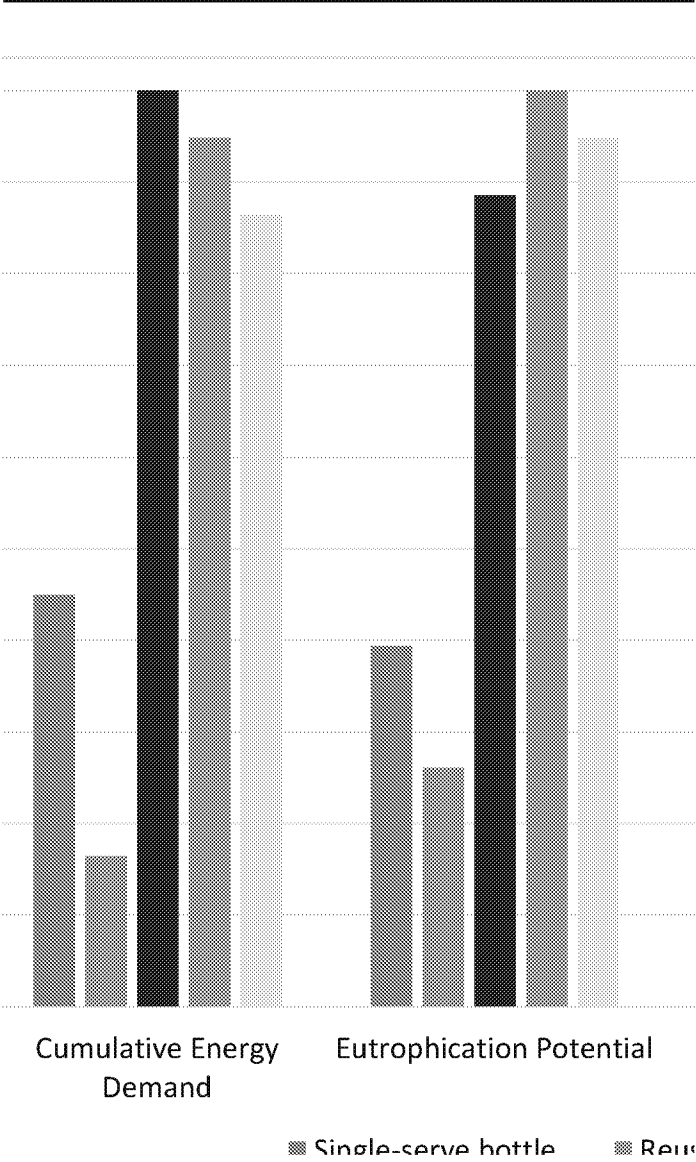


Reusable Container Washing	Disposal	<i>Total</i>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>

ent Contribution		
Reusable Container Washing	Disposal	<i>Total</i>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>
33%	0%	<b>100%</b>

**Relevant Systems**

- Multi-serve reusable jug, AWG
- Multi-serve reusable jug
- Single-serve plastic bottle
- Single-serve plastic bottle
- Single-serve plastic bottle, Multi-serve reusable jug
- Single-serve plastic bottle, Multi-serve reusable jug
- AWG
- AWG
- AWG



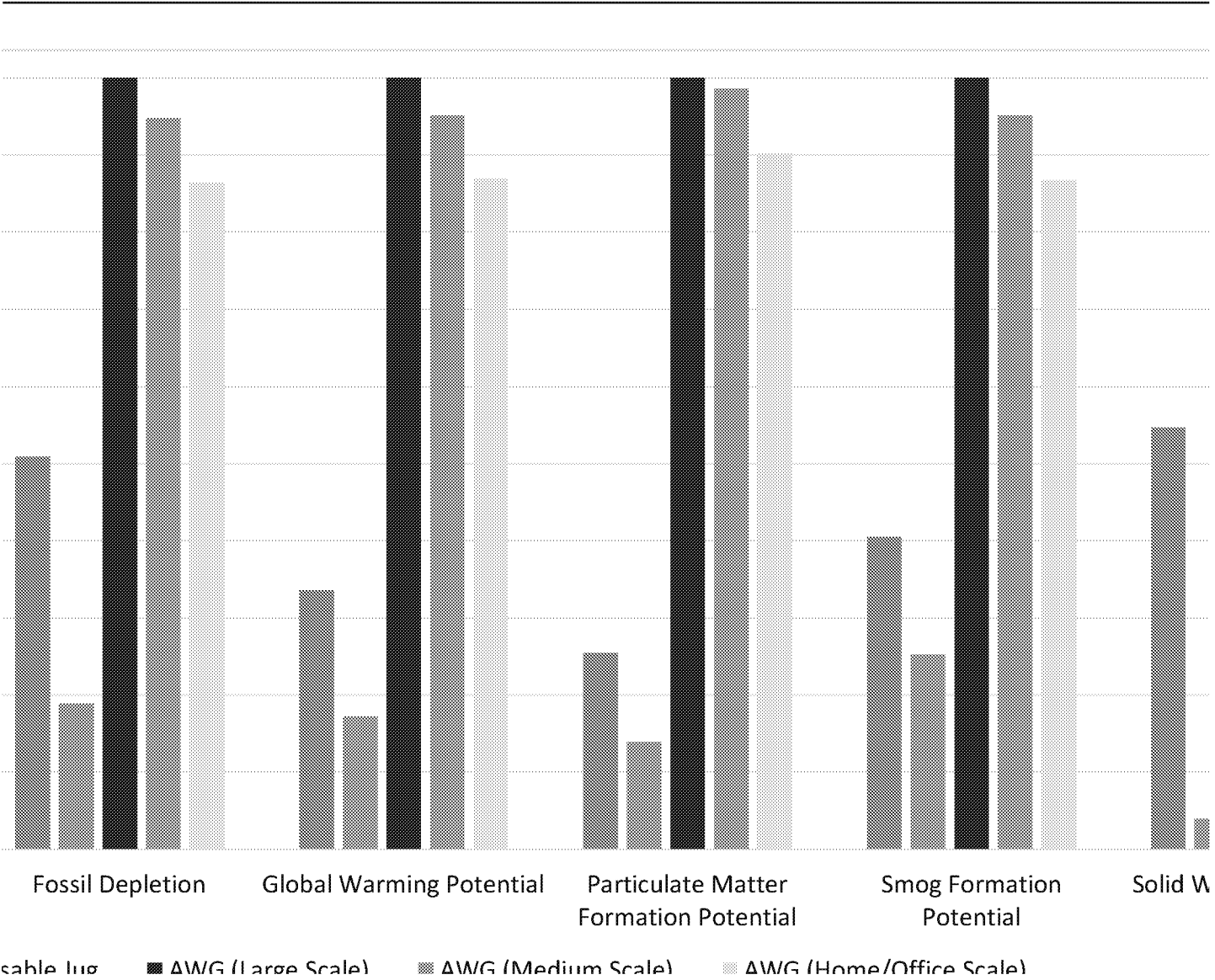
\*\*\* SINGLE SERVE BOTTLE \*\*\* READ

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Table 1

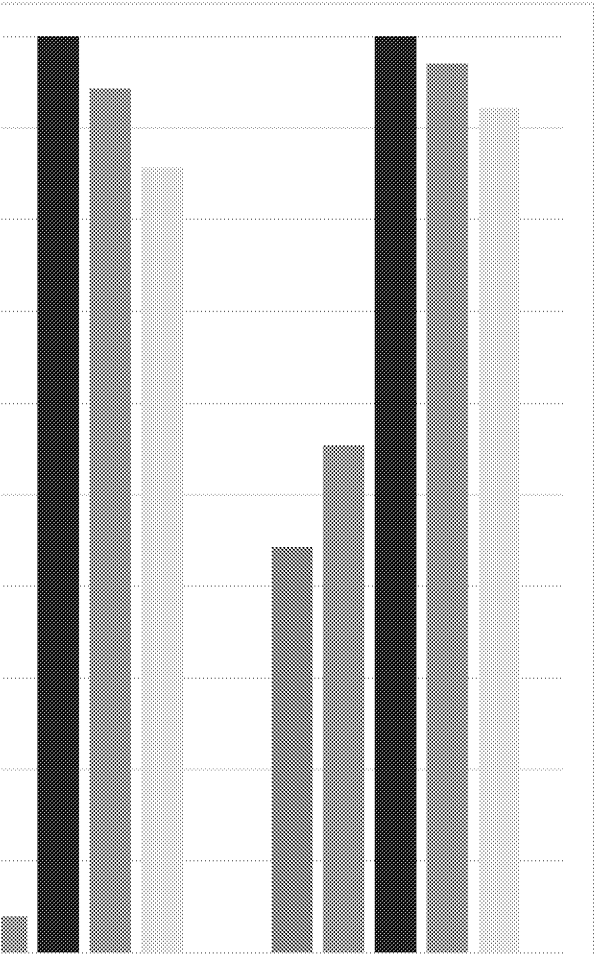
Vendor
Scale
Maximum water produced (L/day)
Minimum water produced (L/day)
Modeled value average water produced (L/day)
Relative Humidity range (%)
Temperature range (°C)



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Watergen			Ecoloblue		
Large	Medium	Home/Office	Large	Medium	Home/Office
5000	578	25	4781	962	30
3000	38	15	193	50	20
3000	400	25	3000	600	30
60	20-70	60	30-80	30-80	0-60
26.7	15-40	26.7	0-55	0-55	25-100



Waste by Weight      Water Consumption



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